NAPA SANITATION DISTRICT
TASK ORDER No. 42
CHEMICAL ALTERNATIVES EVALUATION
BROWN AND CALDWELL

Date: _____

Issued under Professional Services Agreement dated March 30, 2017.

To: Brown and Caldwell

Project Description: Chemical Alternatives Evaluation

Description of Scope of Services to be performed by Consultant under this Task Order:

See Attachment 'A' – Scope of Services

Description of Services to be Provided by District

See Attachment 'A' – Scope of Services

Deliverables

See Attachment 'A' – Scope of Services

Consultant Project Manager: Seppi Henneman

Consultant Quality Control Manager: Melanie Holmer

Schedule to Perform Services

See Attachment 'A' – Scope of Services

Time & Materials Not-to-Exceed Cost Limit: $129,950

See Attachment 'B' – Budget Spreadsheet

APPROVALS:

BROWN AND CALDWELL

By:_____ _____
Date

NAPA SANITATION DISTRICT

By:_____ _____
Purchasing Agent Date

NapaSan Account No.: _____

201 North Civic Drive, Suite 300
Walnut Creek, CA 94596

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ATTACHMENT 'A'

June 15, 2018

Mr. James Keller
Soscol Water Recycling Facility
Napa Sanitation District
1515 Soscol Ferry Road
Napa, CA 94558

071171.023

Subject: Proposed Agreement for Chemical Alternatives Evaluation

Dear Mr. Keller:

In accordance with your request, Brown and Caldwell (Consultant) is pleased to present this proposal for the Chemical Alternatives Evaluation and its impact on recycled water at Napa Sanitation District (District). For convenience, this proposal is presented in a form that can be accepted and signed as an agreement between the Consultant and the District.

Project Understanding

The District currently owns and operates the Soscol Water Recycling Facility (WRF), located at 1515 Soscol Ferry Road, Napa CA. The plant has an average dry weather flow (ADWF) capacity of 15.4 MGD. The WRF is permitted for discharge to the Napa River from October 1 through June 30 and also provides Title 22 unrestricted recycled water for irrigation and other uses.

Currently, the WRF uses the following chloride-based chemicals:

- Ferric chloride;
- Polyaluminum hydroxychloride (PACl); and
- Sodium hypochlorite;

The District would like to investigate alternative methods that would help to lower chloride concentrations in the recycled water while meeting permitted discharge and Title 22 requirements.

The primary purpose of this scope of services is to evaluate alternatives to chloride-based treatment chemicals, and understand facility-wide impacts that may be associated with alternative chemical(s). The evaluation will identify (1) capital improvements, operational requirements, and costs for selected alternative chemicals, (2) impacts for the alternative chemicals to process streams such as odor, nutrients, and biosolids application, and (3) next steps required for implementation for selected alternative chemical, such as design, training, operations, permit-related activities, pilot testing, and process control considerations. Major efforts within this proposed scope of work include:

1. Coordination with operation and maintenance staff to identify challenges with existing chemical systems and obtain data.

2. Description of potential alternative chemicals for hydrogen sulfide control in the digester gas, phosphorus control, coagulation and disinfection.
3. Summary of structural, mechanical and operational modifications needed to accommodate the alternative chemical.
4. Desktop evaluation to estimate dosing requirements.
5. Estimate reduction in chlorides against baseline for each alternative chemical. Baseline is defined as the historical chloride concentrations using the current standard operating procedures at the WRF.
6. Prepare order of magnitude (Class 5) cost estimate for each alternative chemical.
7. Produce Technical Memorandum (TM).

Melanie Holmer will serve as the Technical Lead for the project, with Seppi Henneman as the Project Manager; Melanie and Seppi will be supported by BC staff experienced in evaluation of chemicals for various wastewater and water reuse applications.

Scope of Services

The following is a description of the proposed services to be provided.

- Task 1 – Information and Data Collection
  - Task 1.1 - Facility Information and Data Collection
  - Task 1.2 - Estimating Disinfection Dose Range
- Task 2 – Chemical Alternatives
- Task 3 – Develop and Evaluate Alternatives
- Task 4 – Project Management, Meetings and QA/QC
  - Task 4.1 - Project Management and Meetings
  - Task 4.2 - Project Quality Control (QC) Technical Review

TASK 1: INFORMATION AND DATA COLLECTION

Facility information and water quality data will be collected to support the alternatives evaluation. This task consists of several subtasks.

TASK 1.1 – Facility Information and Data Collection

The District will provide information including chemical usage, process flow diagrams, and as-built information. This subtask includes a site visit and coordination with the District to obtain information on relevant parameters through the regular process monitoring and reporting programs. During data collection and interviews with District staff, the following information will be provided to the Consultant:

- Chemical addition points and the purpose (i.e., odor control, coagulation, etc.) for each injection point;
- Chemical doses;
- Chemical costs; and
- Chemical addition procedures.

The information and data provided by the District, or obtained from generally acceptable sources within the industry without independent verification, will be used in this evaluation. In addition, the Consultant will review of previously conducted peracetic acid

bench and pilot testing conducted as part of a separate WERF LIFT study. The Consultant will procure the bench and pilot testing report from the WERF LIFT study.

Meetings: One (1) site visit, including interviews with District operations and engineering staff, is included in this subtask.

Deliverables: None.

TASK 1.2 – Estimating Disinfection Dose Range

Based on analysis of a filter effluent sample for a suite of water quality parameters, a range of potential ozone demand and applied ozone doses will be developed as well as identification the design ultraviolet transmittance (UVT). The range of applied doses will be used to develop the alternatives and cost estimate in Task 3.

Three samples should be taken from the filter effluent throughout a day, one at peak flow, one at average flow and one at minimum flow. It is assumed that the District laboratory will perform all sampling and the following water quality analyses will be performed on each of the three samples.

The following parameters should be measured:

- Total and dissolved organic carbon (TOC and DOC)
- Total suspended solids (TSS)
- Alkalinity/pH
- Nitrate/Nitrite/Ammonia/Total Kjeldahl Nitrogen
- Dissolved iron and manganese
- Hardness
- UVT
- Temperature
- Turbidity
- Oxidation-Reduction Potential (ORP)
- Calcium
- Dissolved hydrogen sulfide
- Total chloride
- Total sulfate
- Total dissolved solids (TDS)
- Dissolved magnesium
- Soluble reactive phosphorus (SRP)
- Dissolved oxygen

Meetings: None.

Deliverables: Test plan.

TASK 2 – IDENTIFY AND SCREEN ALTERNATIVES

Options for alternative chemicals will be identified and screened for detailed evaluation in Task 3 Develop and Evaluate Alternatives.

TASK 2.1 – Chemical Alternatives (disinfection, ferric chloride, and PACl)

Using the information collected in Task 1, the costs of the existing disinfection practice will be documented, including a summary of the benefits and issues associated with chlorination-dechlorination using sodium hypochlorite and sodium bisulfite.

A summary of alternative disinfection processes, including PAA, ozone, and UV will be prepared. The information developed in this task will be incorporated into Task 3.

Using the information collected in Task 1, the costs of the existing use of ferric chloride and PACl will be documented, including a summary of the benefits and issues associated with these chemicals. Potential chemical alternatives that may provide similar treatment functionality will be identified. A qualitative assessment of the chemical alternatives and their potential application at the WRF, including advantages and disadvantages, will be presented to the District in a Screening Workshop. The purpose of the workshop is to confirm the District's treatment goals, present alternative chemicals to the District, and confirm alternative chemicals to be evaluated in a more detailed alternatives analysis in Task 3.

Meetings: Screening Workshop (2-hour duration).

Deliverables: None.

TASK 3 – DEVELOP AND EVALUATE ALTERNATIVES

Based on the results of the Screening Workshop, alternatives will be developed and evaluated. Key activities in this task include:

- Development of up to three (3) options for disinfection alternatives and description of modifications required for each option, including process flow diagrams and simplified site layouts
- Development of up to four (4) options for chemical alternatives to ferric chloride and PACl and description of modifications required for each option, including process flow diagrams and simplified site layouts
- Summary of potential impacts to auxiliary WRF systems for each option, such as impacts to digester and biosolids handling operations
- Evaluation of costs for the selected chemical alternatives and disinfection alternatives
- Provide recommendations and next steps for implementation of alternative chemicals and disinfection alternatives
- Provide brief discussion on applicability of chemicals to water reuse processes and regulations, existing and anticipated
- Evaluation workshop (2-hour duration), between the draft and final TM deliverables

Meetings: Evaluation Workshop (2-hour duration), between the draft and final TM deliverables.

Deliverables: Draft and Final Chemical Alternatives Evaluation TM in .pdf format. Final version will be based on comments from the Draft due to comments received from the District on the Draft report.

TASK 4 - MEETINGS, PROJECT MANAGEMENT AND QUALITY CONTROL

Activities performed under this task consist of those general functions required to maintain the project on schedule, within budget, and that the quality of the work products defined within this Scope of Services is consistent with the District's expectations and the Consultant's standards. Included specific activities are identified below.

TASK 4.1 - Project Management and Meetings

This Task includes project management, administration, invoicing, and controls to maintain schedule and budget. The Consultant will coordinate with the District, as necessary, for testing site preparation via e-mail and telephone.

Meetings: One kick-off meeting (2-hour duration) and three check-in meetings (1-hour duration).

Deliverables: Monthly invoices.

TASK 4.2 - Project Quality Control (QC) Technical Review

The Consultant maintains a QC program on all projects as per firm-wide required mandates. This task includes the technical review of the TM and the internal oversight of the project.

Data or Coordination Assistance to be Provided by the Owner

1. Access to the site for the initial site visit.
2. Laboratory analyses and results for items identified in Task 1.2.
3. Delivery of facility information, such as chemical use rates and chemical costs, process flow diagrams and as-built drawings and plan views.
4. Timely review of submittals. Three (3) weeks of District review time is assumed.
5. Coordination and payment for District-supplied analytical laboratory services (internal or external).

Schedule

For the Basic Services performed under the Task Authorization, duration of this scope of work is estimated to be four (4) months from the receipt of plant data, pending receipt of the data to be provided by the District.

Compensation and Payment

The Consultant will perform the work outlined in Table 1 for a time and materials not to exceed $129,950. The fee is based on the schedule of hourly billing rates (Attachment B). The hourly billing rates are valid until December 31, 2018. The proposed schedule has all work completed in 2018 so escalation was not accounted for. A detailed breakdown of the budget proposal is presented in Attachment C.

Table 1. Cost Breakdown by Task		
Task	Task title	Fee
1	Information and data collection	$20,399
2	Identify and screen alternatives	$24,355
3	Develop and evaluate alternatives	$62,042
4	Project management, QC, and meetings	$23,155
	TOTAL	$129,950

Terms and Conditions

All work will be performed in accordance with the terms and conditions described in the attached Professional Services Agreement (Agreement) between the Consultant and the District (Attachment A). This Agreement is valid from 2017 through 2020. To accept this proposal, please sign and date two copies and return one copy to Brown and Caldwell within ten days.

We look forward to the opportunity to perform the work for you. Please call Seppi Henneman at 925-210-2317 if you have any questions.

Very truly yours,
Brown and Caldwell

Lori L. Jones, PE
Vice President

Seppi Henneman, PE
Project Manager

The undersigned agrees to the Terms and Conditions of this Letter Agreement attached hereto.

NAPA SANITATION DISTRICT

Signature _____

Printed Name _____

Title _____

Date _____

ATTACHMENT 'B'

Napa Sanitation District (CA) -- Chemical Use Study

Phase	Phase Description	Henneman, Seppi M	Romero, Angela	Holmer, Melanie S	Bell, Katherine Y	Merlo, Rion P	Romero Urbina, Mary Lou	Walter, Breeze A	Mackey, Erin D	Romero, Sara B	Sicora, Susan M	Total Labor Hours	Total Labor Effort	APC	Other Travel	Supplies	Total ODCs	Total Expense Cost	Total Expense Effort	Total Effort
		PM	PA																	
		$154.00	$112.00	$285.00	$314.00	$314.00	$112.00	$154.00	$217.00	$84.00	$112.00									
001	**Information & Data Collection**	48	0	8	4	4	32	0	16	0	0	**112**	**19,240**	**896**	250	0	**250**	**250**	**1,159**	**20,399**
001	Facility Info & Data Collection	44	0	8	4	4	32	0	0	0	0	**92**	15,152	736	250	0	**250**	**250**	**999**	**16,151**
002	Estimating Disinfection Dose Range	4	0	0	0	0	0	0	16	0	0	**20**	4,088	160	0	0	**0**	**0**	**160**	**4,248**
003	PAA Data Review	0	0	0	0	0	0	0	0	0	0	**0**	0	0	0	0	**0**	**0**	**0**	**0**
002	**Identify & Screen Alternatives**	44	0	36	0	8	32	0	0	0	0	**120**	**23,132**	**960**	250	0	**250**	**250**	**1,223**	**24,355**
001	Chemical Alternatives	44	0	36	0	8	32	0	0	0	0	**120**	23,132	960	250	0	**250**	**250**	**1,223**	**24,355**
002	Chem Alt to Ferric Chloride & PACI	0	0	0	0	0	0	0	0	0	0	**0**	0	0	0	0	**0**	**0**	**0**	**0**
003	**Develop & Evaluate Alternatives**	55	0	51	0	32	93	60	16	0	24	**331**	**58,869**	**2,648**	0	500	**500**	**500**	**3,173**	**62,042**
001	Develop & Evaluate Alternatives	55	0	51	0	32	93	60	16	0	24	**331**	58,869	2648	0	500	**500**	**500**	**3,173**	**62,042**
004	**Project Mgmt, QC & Meetings**	36	12	8	16	22	0	0	0	9	0	**103**	**21,807**	**823**	0	500	**500**	**500**	**1,348**	**23,155**
001	Project Mgmt., & Meetings	36	12	0	0	8	0	0	0	9	0	**65**	10,156	520	0	500	**500**	**500**	**1,045**	**11,201**
002	QA/QC	0	0	8	16	14	0	0	0	0	0	**38**	11,651	303	0	0	**0**	**0**	**303**	**11,954**
	GRAND TOTAL	**183**	**12**	**103**	**20**	**66**	**157**	**60**	**32**	**9**	**24**	**666**	**123,048**	**5,327**	**500**	**1,000**	**1,500**	**1,500**	**6,902**	**129,950**

Hours and Dollars are rounded to nearest whole number. To display decimals, change the format of the cells.